

# PATENT ABSTRACTS OF JAPAN

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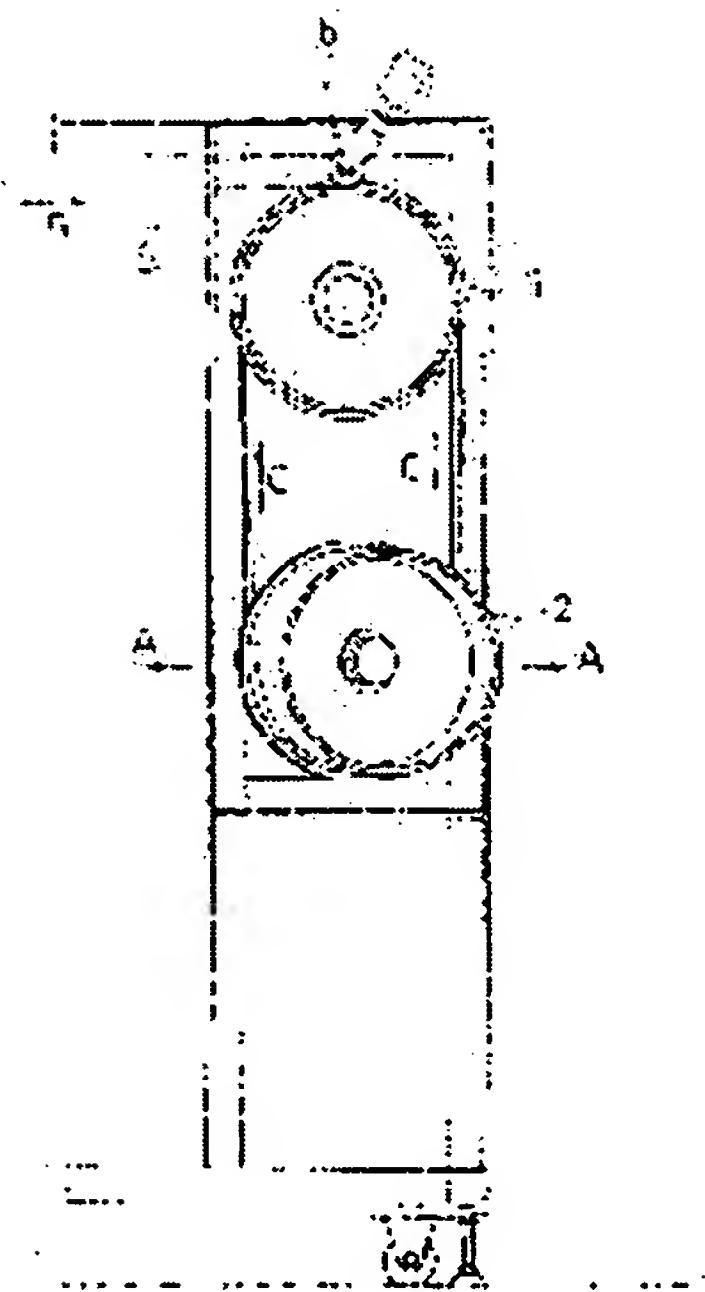
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## **(54) TOPPING SHEET MOLDING APPARATUS AND TOPPING SHEET MOLDING METHOD**



### **(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a topping sheet molding apparatus which arbitrarily alters a bias angle without requiring huge equipment and a large number of processes.

**SOLUTION:** The topping sheet molding apparatus is equipped with a cord supply mechanism for supplying a strip-like topping cord S wherein a reinforcing cord is topped with rubber, a winding drum mechanism having at least a drive drum 1, which winds the topping cord so as to roll the same to form the belt-like topping sheet, and a follower drum 2 and a drum shaft setting mechanism for inclining the drum shaft of the follower drum 2 with respect to the other drum shaft. In a topping cord winding process, the topping cord is wound around a winding drum in such a state that the drum shafts of the drive drum 1 and the follower drum 2 are inclined relatively.

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## CLAIMS

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[Claim(s)]

[Claim 1]

The code feeder style which supplies the strip topping code which carried out the topping of the reinforcement code with rubber,

The drum device with a volume in which it has at least the drum with the 1st volume and the drum with the 2nd volume which twist so that said topping code may be wound, and create a belt-like topping sheet,

It has the drum axiation device in which the drum shaft of either said drum with the 1st volume and a drum with the 2nd volume is made to incline to the drum shaft of another side,

Topping sheet forming equipment characterized by constituting from a condition of said topping code having twisted and having made the drum shaft of said drum with the 1st volume, and a drum with the 2nd volume inclining relatively in a process so that said topping code may be twisted.

[Claim 2]

Topping sheet forming equipment according to claim 1 characterized by establishing the device in which spacing of the drum shaft of said drum with the 1st volume and a drum with the 2nd volume can be changed.

[Claim 3]

Topping sheet forming equipment according to claim 1 or 2 which uses the drum for a drive, and said drum with the 2nd volume as the drum for a follower for said drum with the 1st volume, and is characterized by preparing said drum axiation device in said drum side with the 2nd volume.

[Claim 4]

The step which supplies the strip topping code which carried out the topping of the reinforcement code with rubber,

The step which twists so that said topping code supplied may be wound using the drum device with a volume in which it has a drum with the 1st volume, and a drum with the 2nd volume at least, and creates a belt-like topping sheet,

The topping sheet forming approach characterized by twisting said topping code in the condition of said topping code having twisted and having made the drum shaft of said drum with the 1st volume, and a drum with the 2nd volume inclining relatively in a step.

## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

### [Field of the Invention]

This invention relates to the shaping equipment and the shaping approach of fabricating the topping sheet which carried out the topping of the rubber to the reinforcement code.

[0002]

### [Description of the Prior Art]

The reinforcement code is used for the carcass layer (carcass ply) and belt layer (belt ply) of a pneumatic tire. In order to form a rubber layer like this carcass layer and belt layer, it is necessary to fabricate the topping sheet which carried out the topping of the rubber to one side thru/or both sides of a reinforcement code juxtaposition object which lengthened the reinforcement code in parallel and arranged it. There is the calender fabricating method as a general approach of fabricating a topping sheet.

[0003]

### [Problem(s) to be Solved by the Invention]

However, a facility becomes huge and complicated and the calender fabricating method has the problem of being unsuitable in small lot multiproduct production. Moreover, by the calender fabricating method, although supply of a topping sheet is usually carried out through a decision process, if it is going to change the bias include angle of a topping sheet into arbitration, a man day will increase and it will become the factor of a cost rise on the configuration of a facility.

[0004]

Moreover, as a fabricating method method by the calender fabricating method, there is a strip wind making machine indicated by JP,2000-108222,A. This making machine is a machine which fabricates the tire configuration member to which the strip which consists of an unvulcanized rubber was continuously twisted around the body of revolution for tire shaping, and the laminating of the strip concerned was carried out. However, this making machine is lacking in the versatility of the size of a topping sheet on that property. Moreover, it faces supplying a strip and strip material is specially started from the web material, and although the remainder which started strip material is reused, it cannot be said that it is desirable as productive efficiency.

[0005]

This invention is made in view of the above-mentioned actual condition, and the technical problem is offering the topping sheet forming equipment and the shaping approach of changing into arbitration, without requiring a great man day for a bias include angle, without requiring a huge facility.

### [Means for Solving the Problem]

Topping sheet forming equipment applied to this invention in order to solve the above-mentioned technical problem,

The code feeder style which supplies the strip topping code which carried out the topping of the reinforcement code with rubber,

The drum device with a volume in which it has at least the drum with the 1st volume and the drum with the 2nd volume which twist so that said topping code may be wound, and

create a belt-like topping sheet,

It has the drum axiation device in which the drum shaft of either said drum with the 1st volume and a drum with the 2nd volume is made to incline to the drum shaft of another side,

It is in the condition of said topping code having twisted and having made the drum shaft of said drum with the 1st volume, and a drum with the 2nd volume inclining relatively in a process, and is characterized by constituting so that said topping code may be twisted.

[0006]

An operation and the effectiveness of this topping sheet forming equipment are as follows. First, it has the code feeder style and the strip topping code which carried out the topping of the reinforcement code with rubber is supplied. This topping code is supplied to the drum device with a volume in which it has a drum with the 1st volume, and a drum with the 2nd volume, at least. A topping code is winding around a drum with the 1st volume, and a drum with the 2nd volume, and fabricates a belt-like topping sheet.

However, it is necessary to twist a code, moving a topping code relatively in accordance with the drum shaft of a drum with a volume, in order to fabricate a web material from a strip topping code.

[0007]

Then, in this invention, it is constituted so that the drum shafts of a drum with the 1st volume and a drum with the 2nd volume can be made to incline relatively. By twisting a topping code in the condition of having made drum shafts inclining, the topping code moves automatically in accordance with the drum shaft. namely, The migration device to which a drum with a volume is moved in accordance with a drum shaft, and the migration device to which a code feeder style is moved in accordance with a drum shaft are unnecessary. What is necessary is just to establish the drum axiation device which inclines the drum shaft of a drum with a volume. Moreover, the size of the topping sheet created can be changed into arbitration by changing the inclining include angle. Although the topping sheet fabricated by the drum device with a volume is a belt-like, a plane sheet can be obtained by cutting this belt. Moreover, a bias include angle can be changed into arbitration by choosing the include angle to cut. A bias include angle can be further changed into arbitration, without requiring a great man day, without the molding equipment concerning this invention taking a huge facility.

[0008]

What established the device in which spacing of the drum shaft of said drum with the 1st volume and a drum with the 2nd volume could be changed, as a suitable operation gestalt of this invention is raised.

[0009]

The bore of the belt fabricated can be changed by changing spacing of a drum shaft. Thereby, it can respond to modification of tire size easily.

[0010]

As another suitable operation gestalt of this invention, the drum for a drive and said drum with the 2nd volume are used as the drum for a follower for said drum with the 1st volume, and what prepared said drum axiation device in said drum side with the 2nd volume is raised.

[0011]

When establishing the drum axiation device in which a drum shaft is made to incline, it is

not necessary to complicate the configuration of the drive which drives a drum with a volume by preparing in the drum for a follower.

[0012]

The topping sheet forming approach which starts this invention in order to solve the above-mentioned technical problem,

The step which supplies the strip topping code which carried out the topping of the reinforcement code with rubber,

The step which twists so that said topping code supplied may be wound using the drum device with a volume in which it has a drum with the 1st volume, and a drum with the 2nd volume at least, and creates a belt-like topping sheet,

It is in the condition of said topping code having twisted and having made the drum shaft of said drum with the 1st volume, and a drum with the 2nd volume inclining relatively in a step, and is characterized by twisting said topping code.

This fabricating method method's operation - Effectiveness is as having already stated.

[0013]

[Embodiment of the Invention]

The suitable operation gestalt of the topping sheet forming equipment concerning this invention is explained using a drawing. A side elevation and drawing 3 of the front view of the topping sheet forming equipment which drawing 1 requires for this operation gestalt, and drawing 2 are top views.

[0014]

<Configuration>

This topping sheet forming equipment is equipped with the drive drum 1 and the follower drum 2 which are arranged in the vertical direction. Drive drum 1 (equivalent to a drum with the 1st volume) It is arranged at the bottom and connects with a motor 3. Follower drum 2 (equivalent to a drum with the 2nd volume) It is arranged at the bottom. These drive drum 1 and the follower drum 2 are equivalent to a drum device with a volume. The drive drum 1 is supported with the 1st dram shaft 4, and the follower drum 2 is supported with the 2nd dram shaft 5. Although the 1st dram shaft 4 is being fixed to the frame, the 2nd dram shaft 5 is equipped with the drum axiation device which can be made to incline to the 1st dram shaft 4. In addition, the field where the 2nd dram shaft 5 is movable is in a horizontal plane. Therefore, as shown in drawing 1, the follower drum 2 can carry out a neck swing in the direction of arrow-head A. The stitcher-roller 6 is formed in the top face of the drive drum 1, and it has the function which forces a topping code to a drum side.

[0015]

The strip topping code which carried out the topping of the reinforcement code with rubber is transported from [ of drawing ] arrow-head B. The approach and code feeder style which carry out the topping of the reinforcement code with rubber can use a well-known technique. The supplied topping code is twisted so that it may wind between the drive drum 1 and the follower drum 2. the direction to wind -- clockwise rotation (the direction of arrow-head C of drawing 1 ) it is .

[0016]

<Operation>

Next, drawing 4 explains an operation of this topping sheet forming equipment. (a) twists and is in the condition before initiation. 1a shows the axis of the drive drum 1, and 2a

shows the axis of the follower drum 2 (a broken line shows). As for axis 2a, only the include angle theta inclines to axis 1a. theta can be changed whenever [ this tilt-angle ]. The narrow topping code is twisted so that the drive drum 1 and the follower drum 2 may be straddled.

[0017]

(b) twists and an amount is in the condition of less than one revolution. (c) shows the condition of having twisted one or more revolutions. Since axis 2a of the follower drum 2 is made to incline to axis 1a, as for 2 rotation eye, volume attachment shifts by one pitch. thus -- twisting -- it shifts in the direction of arrow-head E automatically. When volume attachment advances gradually, it comes to be shown in (d). Thereby, a topping sheet can be fabricated.

[0018]

The magnitude of the drive drum 1 and the follower drum 2 can be suitably set up according to the magnitude of the topping sheet to fabricate. The topping sheet fabricated as mentioned above is formed in the shape of a ring. A plane topping sheet can be obtained by cutting the topping sheet of the shape of this ring.

[0019]

Moreover, the ring-like topping sheet with which bores differ can be formed by enabling it to change the wheel base of the drive drum 1 and the follower drum 2. In this case, if a wheel base is changed by moving the follower drum 2 in the vertical direction, a configuration will simplify. Moreover, in case a ring-like topping sheet is cut, a bias include angle can be changed by changing the include angle to cut. Thus, according to the shaping approach concerning this invention, modification of the bias include angle of a topping sheet can be realized easily, and it is suitable for small lot multiproduct production. Moreover, it is not necessary to also enlarge a facility configuration as compared with the calender fabricating method.

[0020]

<Another operation gestalt>

With this operation gestalt, although the drum with a volume is two, a drive drum and a follower drum, it may prepare three or more drums with a volume. Thereby, it can contribute to diversification of the size of a topping sheet. Moreover, it can be set as arbitration of which drum with a volume a drum shaft is made to incline among the drums with a volume which have more than one. Moreover, when making a drum shaft incline, it is made to arbitration also about a setup of the range which can incline, and a tilt angle. However, a configuration simplifies [ the direction established in the follower drum ] a drum axiation device.

[Brief Description of the Drawings]

[Drawing 1] The front view of the topping sheet forming equipment concerning this operation gestalt

[Drawing 2] The side elevation of the topping sheet forming equipment concerning this operation gestalt

[Drawing 3] The top view of the topping sheet forming equipment concerning this operation gestalt

[Drawing 4] Drawing explaining an operation of topping sheet forming equipment

[Description of Notations]

1 Drive Drum

1a Axis  
2 Follower Drum  
2a Axis  
4 1st Dram Shaft  
5 2nd Dram Shaft

Fig 1

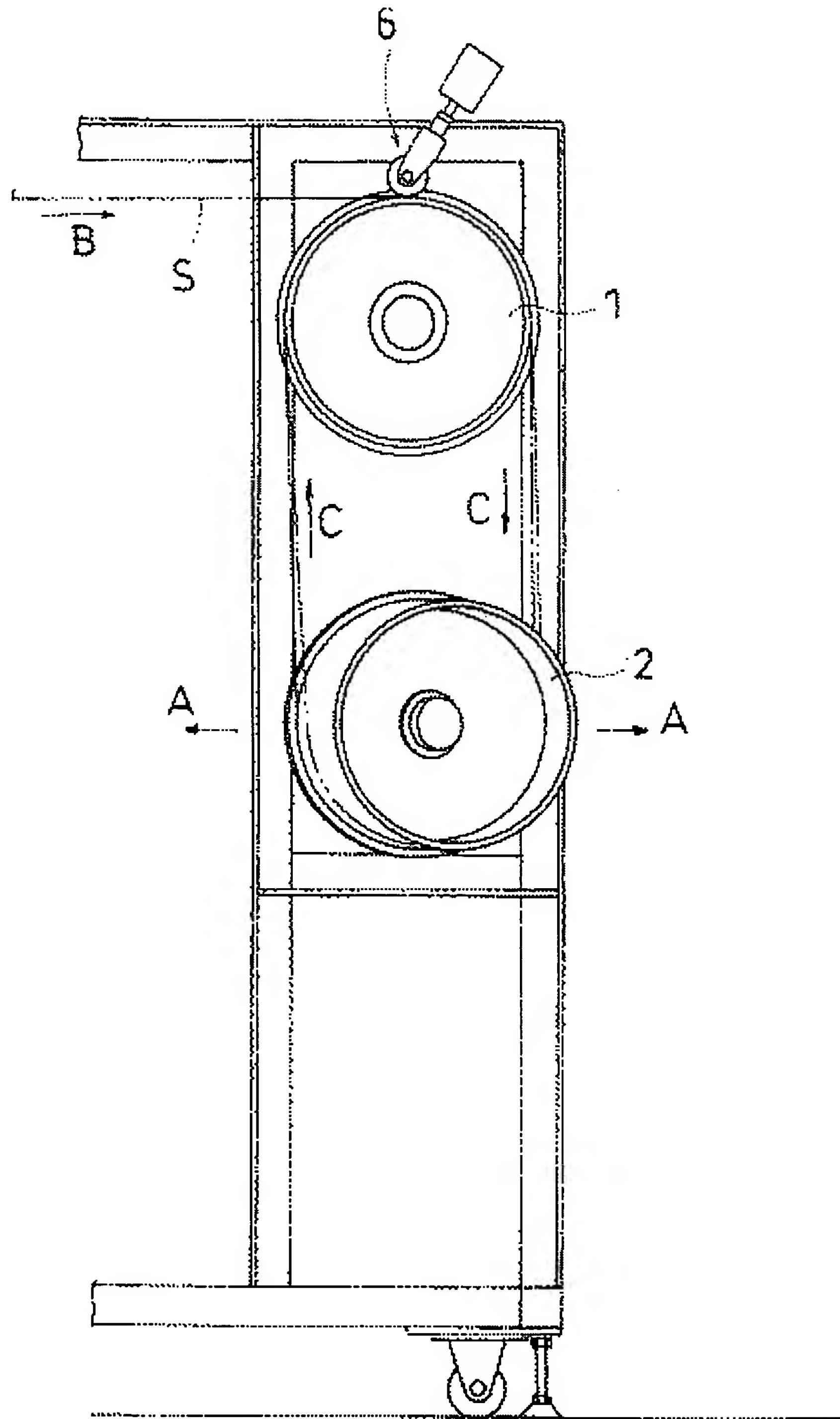


Fig 2

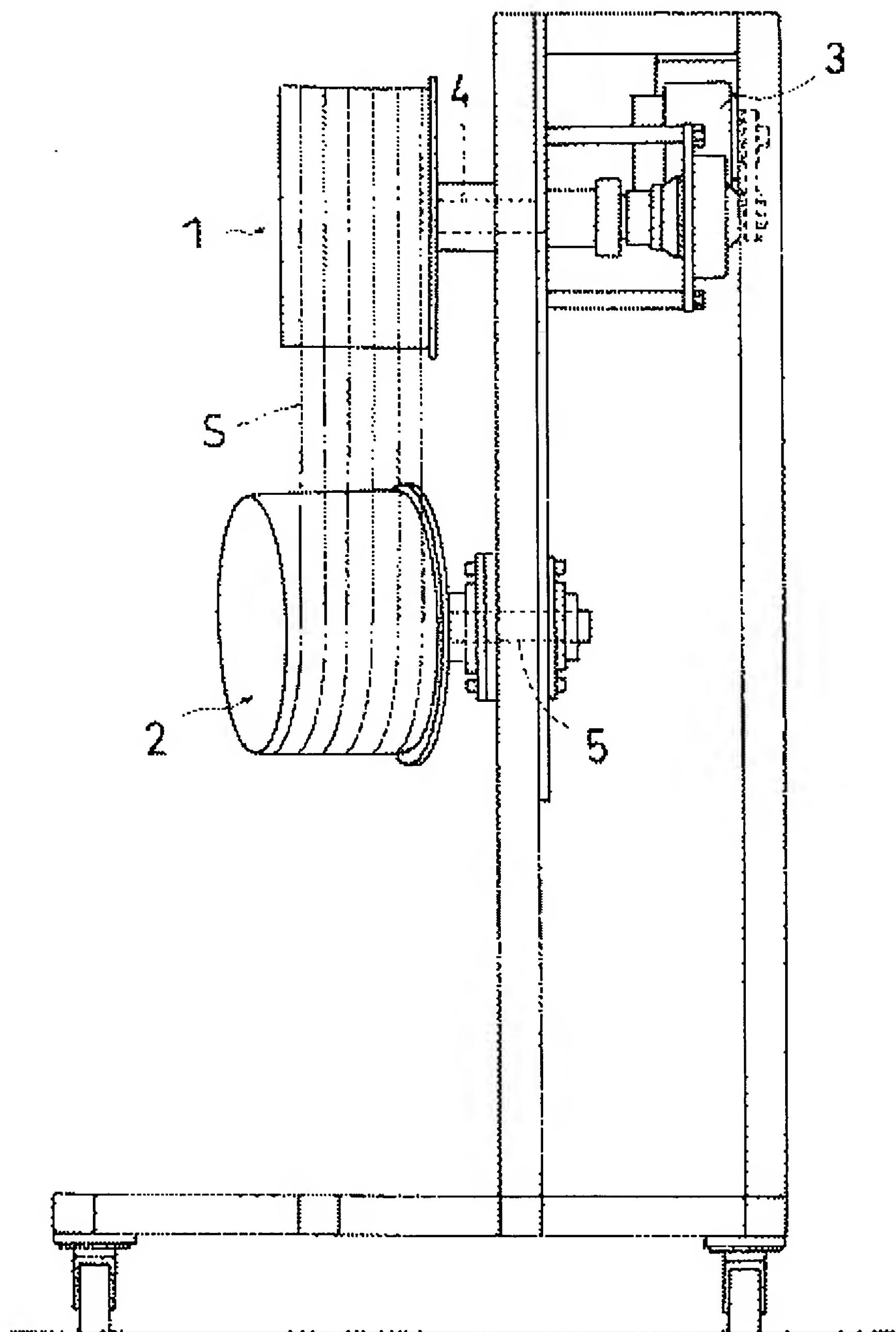


Fig 3

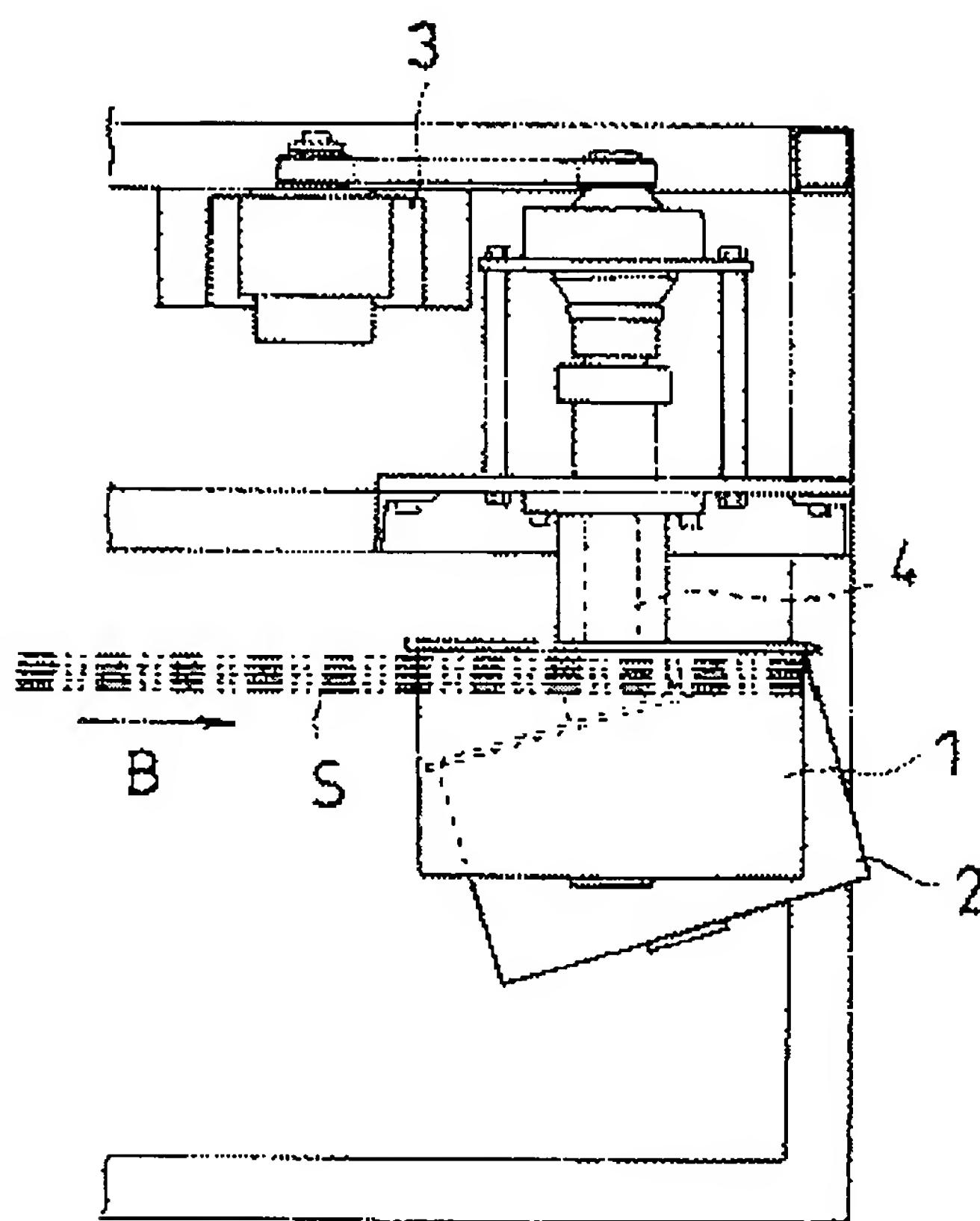


Fig 4

